

CLAIMS

1/ A method of conditioning the atmosphere in a process chamber for treating a substrate, in which method:

the gases are pumped out from the process chamber by
5 means of a primary pump connected to at least one
upstream secondary pump;

the pumping speed is adjusted such as to maintain
the pressure adapted to each treatment step in the
process chamber;

10 the extracted gases are analyzed upstream from the
primary pump; and

the result of the analysis of the extracted gases is
used to adjust the pumping speed as a function of the
pumped gases, so as to determine the variation in the
15 pressure inside the process chamber during the stages of
the treatment.

2/ A method according to claim 1, wherein, to adjust the
pumping speed as a function of the extracted gases, a
20 pre-recorded transfer function is used which, for each
gas mixture present in the process chamber during the
treatment, represents the relationship between the
pumping speed, the flow rate of the gas mixture present,
and the resulting pressure in the process chamber.

25 3/ A method according to claim 1, wherein said at least
one secondary pump is connected to the process chamber
via a pipe.

30 4/ A method according to claim 1, wherein said at least
one secondary pump is adjacent to the process chamber.

5/ A method according to claim 1, wherein:

the gases are treated downstream from the primary
35 pump; and

the gases are analyzed at the outlet of the primary
pump prior to treating the gases, so as to determine

their nature and their state and so as to adapt the pumping parameters, constituted by the temperature of the primary pump, an injection of dilution gas into the primary pump, and the speed of the primary pump, in order
5 to optimize the effectiveness of their treatment.

6/ A method according to claim 5, wherein the gases are analyzed on exiting from the treatment so as to adapt the treatment as a function of the result of said analysis.

10

7/ A method according to claim 6, wherein the pumping is interrupted in the event of a treatment defect.

15

8/ A method according to claim 2, wherein, during a prior training step, the pumping speed is caused to vary in the presence of at least some of the gas mixtures that can be present during the treatment steps in the process chamber, and the resulting pressure in the process chamber is measured to determine said transfer function.

20

9/ Apparatus for conditioning the atmosphere in a process chamber for treating a substrate, for implementing the method according to claim 1, said apparatus comprising:

a pumping line comprising said primary pump
25 constituted by a variable-speed dry primary pump, and at least one upstream secondary pump;

speed control means for controlling the speed of the primary pump;

first gas analyzer means suitable for analyzing the
30 extracted gases upstream from the primary pump, and for producing first gas analysis signals; and

first signal processing means for producing a speed control signal as a function of said first gas analysis signals, and for transmitting said speed control signal
35 to the primary pump.

10/ Apparatus according to claim 9, wherein the first signal processing means perform relationship matching between the first analysis signals at their inlet and the speed control signal at their outlet, using a pre-
5 recorded transfer function that, for each gas mixture present in the process chamber during the treatment of the substrate, represents a relationship between the pumping speed, the flow rate of the gas mixture present, and the resulting pressure in the process chamber.

10 11/ Apparatus according to claim 9, wherein the secondary pump is connected to the process chamber via a pipe of length generally less than 3 meters.

15 12/ Apparatus according to claim 9, wherein the secondary pump is adjacent to the process chamber.

13/ Apparatus according to claim 9, further comprising:
20 downstream from the primary pump, gas treatment means for treating the extracted gases;
at the outlet of the primary pump, second gas analyzer means determining the nature and the state of the pumped gases and producing second gas analysis signals; and

25 second signal processing means for producing second speed control signals for controlling the speed of the primary pump as a function of the second gas analysis signals.

30 14/ Apparatus according to claim 13, further comprising pumping conditioning means comprising pump temperature control apparatus associated with said primary pump, and dilution gas injection apparatus for injecting dilution gas into said primary pump and receiving said second
35 control signals for their own control purposes, so as to optimize the effectiveness of the gas treatment means.

15/ Apparatus according to claim 13, further comprising
third gas analyzer means adapted for analyzing the gases
at the outlet of the gas treatment means, and for
adapting the gas treatment means as a function of said
5 analysis.

16/ Apparatus according to claim 9, wherein the primary
pump, the gas treatment means and the gas analyzer means
are enclosed together in an isolation enclosure.

10

17/ Apparatus according to claim 16, wherein the
isolation enclosure is provided with temperature
monitoring and regulation apparatus for monitoring and
regulating the temperature of the contents of the
15 isolation enclosure.

18/ Apparatus according to claim 16, wherein the
isolation enclosure is provided with active vibration-
compensating means for compensating the mechanical
20 vibrations generated by the contents of the isolation
enclosure.

19/ Apparatus according to claim 16, wherein the
isolation enclosure further encloses a controller,
25 constituting said signal processing means for generating
the speed control signal for controlling the speed of the
primary pump and/or the speed of the secondary pump as a
function of the signals received from the gas analyzer
means.

30

20/ Apparatus according to claim 9, wherein said
controller is suitable for delivering the appropriate
control signals as a function of the status of the
process chamber equipment: production stage; test stage;
35 maintenance stage; standby stage.